

Extra Practice - Combining Functions

SOLUTIONS

5) $f(x) + g(x)$

$$= \underline{3x^2 + 4x - 5} + \underline{2x + 9} = \boxed{3x^2 + 6x + 4}$$

$f(x) - g(x)$

$$= 3x^2 + 4x - 5 - \widehat{(2x + 9)}$$

$$= 3x^2 + 4x - 5 - 2x - 9 = \boxed{3x^2 + 2x - 14}$$

$f(x) \cdot g(x)$

$$= (3x^2 + 4x - 5)(2x + 9)$$

$$= \boxed{6x^3 + 35x^2 + 26x - 45}$$

	$3x^2$	$4x$	-5
$2x$	$6x^3$	$8x^2$	$-10x$
9	$27x^2$	$36x$	-45

$$\left(\frac{f}{g}\right)(x) = \boxed{\frac{3x^2 + 4x - 5}{2x + 9}}$$

6) $[f \circ g](x) = f(g(x))$

put g inside f $= 2(\underline{3 + x}) + 5$

$$= 6 + 2x + 5$$

$$= \boxed{11 + 2x}$$

$[g \circ f](x) = g(f(x))$ ← put f inside g

$$= 3 + (2x + 5)$$

$$= \boxed{2x + 8}$$

$$\begin{aligned}
 7) [f \circ g](x) &= f(g(x)) \\
 &= 2(x^2 - 2x) - 3 \\
 &= \boxed{2x^2 - 4x - 3}
 \end{aligned}$$

$$\begin{aligned}
 [g \circ f](x) &= g(f(x)) \\
 &= (2x - 3)^2 - 2(2x - 3) \\
 &= (2x - 3)(2x - 3) - 4x + 6 \\
 &= 4x^2 - 6x - 6x + 9 - 4x + 6 \\
 &= \boxed{4x^2 - 16x + 15}
 \end{aligned}$$

$$\begin{aligned}
 11) f(x) + g(x) \\
 &= x^2 - 2x + x + 9 \\
 &= \boxed{x^2 - x + 9}
 \end{aligned}$$

$$\begin{aligned}
 f(x) - g(x) \\
 &= x^2 - 2x - (x + 9) \\
 &= x^2 - 2x - x - 9 \\
 &= \boxed{x^2 - 3x - 9}
 \end{aligned}$$

$$\begin{aligned}
 f(x) \cdot g(x) \\
 &= (x^2 - 2x)(x + 9) \\
 &= x^3 + 9x^2 - 2x^2 - 18x \\
 &= \boxed{x^3 + 7x^2 - 18x}
 \end{aligned}$$

$$\frac{f(x)}{g(x)} = \boxed{\frac{x^2 - 2x}{x + 9}}$$

* Don't worry about #12, 13, 14 ... there won't be functions that are fractions on tomorrow's quiz.

$$\begin{aligned}
 15) [f \circ g](x) &= f(g(x)) \\
 &= (x + 4)^2 - 9 \\
 &= (x + 4)(x + 4) - 9 \\
 &= x^2 + 4x + 4x + 16 - 9 \\
 &= \boxed{x^2 + 8x + 7}
 \end{aligned}$$

$$\begin{aligned}
 [g \circ f](x) &= g(f(x)) \\
 &= (x^2 - 9) + 4 \\
 &= \boxed{x^2 - 5}
 \end{aligned}$$

$$\begin{aligned}
 16) [f \circ g](x) &= f(g(x)) \\
 &= \frac{1}{2}(x+6) - 7 \\
 &= \frac{1}{2}x + 3 - 7 \\
 &= \boxed{\frac{1}{2}x - 4}
 \end{aligned}$$

$$\begin{aligned}
 [g \circ f](x) &= g(f(x)) \\
 &= \left(\frac{1}{2}x - 7\right) + 6 \\
 &= \boxed{\frac{1}{2}x - 1}
 \end{aligned}$$

$$\begin{aligned}
 17) [f \circ g](x) &= f(g(x)) \\
 &= \boxed{3x^2 - 4}
 \end{aligned}$$

$$\begin{aligned}
 [g \circ f](x) &= g(f(x)) \\
 &= 3(x-4)^2 \\
 &= 3(x-4)(x-4) \\
 &= 3(x^2 - 4x - 4x + 16) \\
 &= 3(x^2 - 8x + 16) \\
 &= \boxed{3x^2 - 24x + 48}
 \end{aligned}$$

$$\begin{aligned}
 18) [f \circ g](x) &= f(g(x)) \\
 &= (5x^2)^2 - 1 \\
 &= \boxed{25x^4 - 1}
 \end{aligned}$$

$$\begin{aligned}
 [g \circ f](x) &= g(f(x)) \\
 &= 5(x^2 - 1)^2 \\
 &= 5(x^2 - 1)(x^2 - 1) \\
 &= 5(x^4 - x^2 - x^2 + 1) \\
 &= 5(x^4 - 2x^2 + 1) \\
 &= \boxed{5x^4 - 10x^2 + 5}
 \end{aligned}$$

$$\begin{aligned}
 19) [f \circ g](x) &= f(g(x)) \\
 &= 2(x^3 + x^2 + 1) \\
 &= \boxed{2x^3 + 2x^2 + 2}
 \end{aligned}$$

$$\begin{aligned}
 [g \circ f](x) &= g(f(x)) \\
 &= (2x)^3 + (2x)^2 + 1 \\
 &= \boxed{8x^3 + 4x^2 + 1}
 \end{aligned}$$

$$\begin{aligned}
 20) [f \circ g](x) &= f(g(x)) \\
 &= 1 + (x^2 + 5x + 6) \\
 &= \boxed{x^2 + 5x + 7}
 \end{aligned}$$

$$\begin{aligned}
 [g \circ f](x) &= g(f(x)) \\
 &= (1+x)^2 + 5(1+x) + 6 \\
 &= (1+x)(1+x) + 5 + 5x + 6 \\
 &= 1 + x + x + x^2 + 5 + 5x + 6 \\
 &= \boxed{x^2 + 7x + 12}
 \end{aligned}$$

* Don't worry about #21-24